CLAIMS

1. A method for characterizing a liquid containing particles that reflect ultrasound, wherein a specimen of the fluid placed between two surfaces (5, 6) in a rheometer (1) in order to measure rheological characteristics of the specimen (8) is stressed when the two surfaces (5, 6) undergo relative movement one with respect to the other, characterized in that local ultrasonic data relating to the deformation of the specimen (8) are furthermore collected by ultrasonic wave measurement means (2, 3, 4).

2. The method as claimed in claim 1, wherein the local ultrasonic data relating to the deformation of the specimen (8) are collected by probing said specimen with ultrasonic waves with a frequency of above 20 MHz.

3. The method as claimed in either of the preceding claims, wherein the operation of the rheometer (1) delivers a temporal reference for the collection of the local ultrasonic data relating to the displacement of the specimen (8) subjected to the stresses induced by the rheometer (1).

4. The method as claimed in one of the preceding claims, wherein the local ultrasonic deformation data correspond to the displacement of a multitude of points along an axis Z, this multitude of points forming a substantially continuous field of observation, this method including an observation step during which:

- several ultrasonic pulses are sent in succession into the specimen (8) with a pulse repetition frequency of between 0 and 20 kHz;
- echoes corresponding to each ultrasonic pulse reflected by the reflecting particles of the specimen (8) are detected; and
- displacements in the specimen (8) between two

pulses for points in the field of observation are calculated locally using a cross-correlation technique on the ultrasonic local data.

5. The method as claimed in claim 4, wherein a calibration step precedes the step of observing the displacement of the fluid specimen by means of ultrasonic waves, which calibration step is carried out with a fluid specimen for which the theoretical local data relating to deformation are known and along an arbitrarily fixed firing axis Z, and during which measurement correction factors are calculated by adjusting the known theoretical local specimen deformation data to the local deformation data measurements collected by means of the ultrasonic waves.

6. The method as claimed in claim 4 or 5, wherein said observation step is followed by an image display step during which all the positions of a multitude of points on the Z axis are observed as a function of time, via the pressure amplitude on a pressure probe (2) of the echoes corresponding to each ultrasonic pulse reflected by the reflecting particles of the specimen, it being possible for this amplitude to be chromatically coded.

7. The method as claimed in claim 4, 5 or 6, wherein said observation step is followed by a velocity calculation step on the basis of displacements of the points in the field of observation at a given instant, along the Z axis, then this calculation is repeated several times and, after having averaged all the velocities obtained at each of the points in the field of observation, a velocity profile along the Z axis is determined.

8. The method as claimed in claim 7, wherein several velocity profiles along the Z axis are determined in

succession and at a frequency of between 0.1 Hz and 1 kHz.

9. The method as claimed in claim 4, 5, 6, 7 or 8, wherein the field of observation extends over at least a plane containing a first axis Z and a second axis Y that makes any angle with said first axis.

10. The method as claimed in claim 4, 5, 6, 7, 8 or 9, wherein, during said observation step, an array of several ultrasonic transducers (T_1, ..., T_n) placed along at least the Z axis is used in order to emit the ultrasonic pulses and to detect the echoes corresponding to each ultrasonic pulse reflected by the reflecting particles of the specimen (8) so as to supply an image of the displacements of the points in the field of observation at a given instant t.

11. A device for characterizing a fluid, consisting of a rheometer (1) for applying, between two surfaces (5, 6) in relative movement one with respect to the other, stresses to a specimen (8) of the fluid lying between these two surfaces (5, 6) and for measuring rheological characteristics averaged over the volume of the specimen (8), characterized in that it further includes an ultrasonic device (2, 3, 4) for measuring local deformations by ultrasonic wave measurement means, this ultrasonic device comprising:

- an ultrasonic wave generator (2, 3) for sending such waves into the specimen, in a sequence of several firings; and
- an ultrasonic wave receiver (3) for detecting the echoes reflected by the reflecting particles of the fluid that correspond to each ultrasonic wave firing, these echoes being used to locally monitor the deformation of the fluid as a function of time.

12. The device as claimed in claim 11, wherein the ultrasonic wave generator (3) of the ultrasonic device

emits ultrasonic waves with a central frequency of above 20 MHz.

13. The device as claimed in either of claims 11 and 12, wherein said rheometer includes a Couette cell with a thickness of less than 4 mm.

14. The device as claimed in one of claims 11, 12 and 13, wherein the ultrasonic device includes an array of several ultrasonic transducers (T_1,...,T_n) placed along at least the Z axis in order to emit the ultrasonic pulses and to detect the echoes corresponding to each ultrasonic pulse reflected by the reflecting particles of the specimen (8), so as to provide an image of the displacements of the points in the field of observation at a given instant t.